Prof. Poynting
Hagley Road
Edgbaston
10 March 1884

Dear Prof. Thompson.

Many thanks for your note acknowledging the receipt of the papers which I sent you. I don't know when my paper on the transfer of Energy is to be published - the R.S. moves with such majestic slowness. If it has the good fortune to get into the Transactions for which I sent it I suppose it will be some months yet - at least - before it is printed

I think I can give you an abstract of the fundamental proposition if you will allow me to reflect it upon you.

According to Maxwell the energy per unit vol in the electric field is $\frac{KP^2 + \mu B^2}{4\pi}$ where P is the electromotive & B the magnetic intensity If any change is taking place the rate of increase of energy is

$$\frac{1}{4\pi}\left(K P \frac{dP}{dt} + \mu B \frac{dB}{dt}\right)$$

Integrating this for the space within any closed surface & transforming by means of Maxwell's equations the integral becomes a surface integral which on interpretation signifies that the energy moves perpendicularly to the plane containing the Electric & magnetic forces at any point - the amount crossing unit area per sec = $\frac{PB \sin \widehat{PB}}{4\pi}$ *

Apply this to the case of a cylindrical surface just outside & surrounding a wire carrying a current C. If R is resistance of unit length of wire $C = \frac{P}{R}$ or $P = CR$

$B = \frac{2C}{a}$ where a is rad of wire

The amount entering unit length of cylinder = $\frac{PB \times \text{area}}{4\pi}$

$$= \frac{CR \times \frac{2C}{a} \times 2\pi a \times 1}{4\pi}$$

$$= C^2 R$$

Or the amount entering thus just accounts for the heat developed in the wire.

* The direction of flow is always that in wh a right handed screw moves if turned from P round to B

from this it would appear
that the energy moves with the
wave from the dielectric at right
angles to the surface. The lines
of flow being perpendicular to the
electric & magnetic forces must
be the lines of intersection of
the equipotential electric &
equipotential magnetic surfaces
when such exist.
I will send you a copy of
the paper as soon as I get it-

Yours sincerely
J. J. Thomson

Prof S P Thompson D.Sc.

DSI

5853 **POYNTING** (**John Henry**, F.R.S., *Prof. Physics, Birmingham*, 1852-1914) A.L.S. (J. H. POYNTING), Hagby Road, Edgbaston, 10 March 1884, to 'Dear Prof. [Silvanus P.] Thompson,' 4 pages 8vo., £1, 1*s*

LONDON SOTHERAN

52

Being a very full synopsis of a proposed paper on the Transfer of Energy.

studente, ma varie volte mi ha visitato come conoscente, e cosi ho avuto occasione di mostrargli le mie esperienze sulle onda elettrica. Il padre del Marconi è di Bologna, ma la madre è inglese. Egli è assai ricco, e non la fatta studi regolari.'

5871 —— A.L.S. (AUGUSTE RIGHI), same address, undated, to the same, 2 pages 8vo., £1, 5*s*

'Une Societé scientifique italienne voudrait assigner un prix scientifique à Marconi, surtout pour ses derniers per-